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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/597,532

07/28/2006

Matthew Bruce

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08/30/2010

PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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EXAMINER

NGUYEN, HIEN NGOC

ART UNIT

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3768

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/597,532	<b>Applicant(s)</b> BRUCE ET AL.	
	<b>Examiner</b> HIEN NGUYEN	<b>Art Unit</b> 3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07/28/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

In view of the Appeal Brief filed on 06/14/2010, PROSECUTION IS HEREBY REOPENED. The new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

### ***Claim Objections***

Claim 1 is objected to because limitations “processing the echo signals to detect the tissue structure in the absence of microbubbles” is not required to form and display an image in the last step of claim 1. What is this limitation for? It is not being used in the later steps of claim 1.

### ***Claim Rejections - 35 USC § 103***

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1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama (US 6,673,019).

3. Addressing claim 1, Kamiyama discloses a method of ultrasonically imaging blood perfusion and blood flow comprising: acquiring a sequence of ultrasonic echo signals from a body which has been infused with an ultrasonic contrast agent (see col. 5, lines 3-20); processing the echo signals to detect the tissue structure in the absence of microbubbles (see col. 6, lines 1-13, echo signals inherent to tissue are echo signals in the absence of microbubbles because tissue structure does not have microbubbles; microbubbles exist in blood flow); processing a plurality of the echo signals in a first way to detect echo signals returned from tissue microvasculature perfuse with the contrast agent (see Fig. 4, col. 11-col.12, the subtraction, processing two different signals using 24A and 24B, 24A is the first way and 24B is the second way); processing a plurality of the echo signals in a second way to detect echoes returned from blood flow containing the contrast agent in larger vessels (see Fig. 4, col. 11-col.12, the subtraction, two different signals, processing 24A and 24B, 24A is the first way and 24B is the second way); utilizing the echo signals processed the first way to form a portion of an image

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depicting perfusion (see col. 4, lines 55-65, col. 5, line 54-col. 6, line 13, col. 20, lines 23-35; the contrast agent image is the image perfusion; it would have been obvious to one of ordinary skill in the art at the time of the invention to form an image or a portion of an image because this is a operator choice and it accomplishes the same purpose of showing only a certain detail such as image perfusion); utilizing the echo signals processed the second way to form a portion of an image depicting blood flow in larger vessels (see col. 4, lines 55-65, col. 5, line 54-col. 6, line 23, col. 20, lines 23-35; the steady tissue is the image of blood flow in larger vessel, Kamiyama discloses clear/distinguishable image of contrast agent, tissue and large or even minute blood flow; it would have been obvious to one of ordinary skill in the art at the time of the invention to form an image or a portion of an image because this is a operator choice and it accomplishes the same purpose of showing only a certain detail such as blood flow in larger vessel); displaying an ultrasound image depicting both contrast-enhance perfusion and contrast-enhance blood flow (see col. 20, lines 23-35, the combine image display both contrast-enhance perfusion and contrast-enhance blood flow).

4. Addressing claims 2, 5-6 and 9, Kamiyama discloses depicting both the presence and locations of microbubbles in tissue and the velocity of microbubbles in blood flow (see col. 5, lines 3-20, the detected ultrasound echo signals provide the locations and velocity of microbubbles in the blood; from these echo signals operator display the location and velocity of the microbubbles in the blood); processing a plurality of echo signals in first and second ways comprises processing the same ensemble of echo signals in first and second ways (see Fig. 4 and col. 11-col.12); acquiring an ensemble

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of echoes over time from each of a plurality of different locations in the body (see col. 9, line 4-14, Kamiyama discloses a method and apparatus can be applied to diagnosis of all regions of interest whose blood flow states can be observed base on contrasted agent therefore it would have been obvious to one of ordinary skill in the art at the time of the invention that echo are acquired from a plurality of different locations in the body); utilizing the echo signals processed the first way further comprises forming a perfusion image and wherein utilizing the echo signals processed the second way further comprises forming a flow image and displaying an ultrasound image further comprises displaying the perfusion image overlaid with the flow image (see col. 4, lines 55-65, col. 5, line 54-col. 6, line 23 and col. 20, lines 23-35, the combine image show perfusion image and flow image).

5. Claims 3-4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama (US 6,673,019) and in view of Brock-Fisher et al. (US 2003/0204142).

6. Addressing claims 3-4 and 7, Kamiyama does not explicitly disclose deciding the portion of the image which an echo signal is to form on the basis of blood flow velocity estimation; deciding the portion of the image which an echo signal is to form on the basis of a blood flow variance estimation; detecting amplitude or power of echo signals; and use Doppler mode to process plurality of echo signals. However, in the same field of endeavor, which is ultrasound imaging, Brock-Fisher discloses deciding the portion of the image which an echo signal is to form on the basis of a blood flow velocity

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estimation (see [0003-0005] and [0011-0014]); deciding the portion of the image which an echo signal is to form on the basis of a blood flow variance estimation (see [0011-0014], [0075] and [0078], image is formed from the detect echo signals; these signals are detected using Doppler mode; Doppler mode determines the blood flow variance estimation from the echo signals and forms an image base on this variance estimation); detecting the amplitude or power of the echo signals (see [0037], [0044], [0049] and [0051]) and wherein processing comprises using Doppler mode to process the plurality of the echo signals (see [0075] and [0078]). It would have been obvious to one of ordinary skill in the art at the time of the invention to decide the portion of the image which an echo signal is to form on the basis of a blood flow velocity estimation; deciding the portion of the image which an echo signal is to form on the basis of a blood flow variance estimation; detecting the amplitude or power of the echo signals and using Doppler mode to process the plurality of the echo signals as taught by Brock-Fisher because the Doppler mode or color-flow mode provide good quality image and information to diagnosticians regarding the flow and velocity of blood/fluid inside the body (see [0003]).

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama (US 6,673,019), in view of Brock-Fisher et al. (US 2003/0204142) and further in view of Burns et al. (US 6,095,980).

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8. Addressing claim 8, Kamiyama and Brock-Fisher does not detect nonlinear components of the echo signals by the pulse inversion technique. Burns discloses detecting nonlinear components of the echo signals by the pulse inversion technique to be more effective in separating overlap fundamental and harmonic energy (see col. 1, lines 5-23 and 55-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kamiyama's method to detect nonlinear components of the echo signals by the pulse inversion technique as taught by Burns because this technique is more effective in separating overlap fundamental and harmonic energy and produce a higher quality image.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama (US 6,673,019), in view of Burns et al. (US 6,095,980) and further in view of Bruce et al. (US 6,620,103).

10. Addressing claim 10, Kamiyama does not disclose transmitting differently modulated pulses in each of a plurality of different beam directions and detecting harmonic components of the echo signals by the pulse inversion technique. Bruce discloses transmitting differently modulated pulses in each of a plurality of different beam directions (see abstract, claims 19 and 23). Burns discloses detecting nonlinear components of the echo signals by the pulse inversion technique to be more effective in separating overlap fundamental and harmonic energy; (see col. 1, lines 5-23 and 55-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kamiyama's method to transmit differently modulated pulses



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in each of a plurality of different beam directions and detect nonlinear components of the echo signals by the pulse inversion technique as taught by Bruce and Burns in order to acquire echoes which could be combined to separate harmonic frequencies by pulse inversion. Further, pulse inversion technique is more effective in separating overlap fundamental and harmonic energy and produces a higher quality image.

11. Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama (US 6,673,019), in view of Brock-Fisher et al. (US 2003/0204142), further in view of Burns et al. (US 6,095,980) and Bruce et al. (US 6,620,103).

12. Addressing claims 11-20, Kamiyama discloses all the structures that are capable of performing the functions in the system claims 11-20. Kamiyama discloses ultrasound probe/beamformer, memory, display, circuit, processor and adjust intensity/opacity of combine image (see Fig. 1, 4 and claims 10-11). Brock-Fisher discloses amplitude detector and many processors for Doppler processing, power modulation and image process (see Fig. 2, 5 and 6). Kamiyama and Brock-Fisher disclose the structures. Burns and Bruce disclose functionality of pulse inversion and transmitting differently modulated pulses in each of a plurality of different beam directions.

### ***Response to Arguments***

Applicant's arguments, see Appeal Brief page 6-13, filed 06/14/2010, with respect to the rejection(s) of claim(s) 1-20 under Brock-Fisher in view of Burns and

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Bruce have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kamiyama, Brock-Fisher, Burns and Bruce.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIEN NGUYEN whose telephone number is (571)270-7031. The examiner can normally be reached on 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571)272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. N./  
Examiner, Art Unit 3768

/Long V Le/  
Supervisory Patent Examiner, Art Unit 3768